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## Beyond Abilities: A Dispositional Theory of Thinking

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Most views of good thinking and its development hold that good thinking depends on general and specific abilities. A theory of good thinking based on the concept of dispositions is proposed here. Dispositions are often considered to be a matter of motivation. However, defined here is an expanded concept called *triadic dispositions* which emphasizes (a) inclinations, which may reflect motivation, habit, policy, or other factors; (b) sensitivity to occasion; and (c) abilities themselves. Advanced is a list of seven general dispositions that are argued to be collectively sufficient and individually necessary for a general characterization of good thinking. For example, these include the disposition to be broad and adventurous, the disposition toward sustained intellectual curiosity, and the disposition to be metacognitive. Finally, it is argued that a dispositional perspective on good thinking is a generative way of approaching issues concerning theories of thinking, the generality of thinking abilities, conceptual development, culture, and education.

Charles Darwin was already in his youth a dedicated and enthusiastic naturalist. This tale is told to illustrate the passion of his pursuits: One day he encountered a novel species of beetle in a field. Having no container for the beetle, he popped it into his mouth and held it carefully there as he ran home.

One striking feature of Darwin's solution was his cognitive ability to find a container at hand when none was obvious. Far from displaying what Duncker and other psychologists have called *functional fixedness* (i.e., difficulty in seeing alternative functions in objects with a conventional function), Darwin showed functional flexibility (Duncker, 1945). But another feature is even more singular: Darwin's ready use of the

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solution he found. Most of us would not care to carry beetles around in our mouth. Perhaps neither did Darwin. But it was a minor matter compared to his enthusiasm for entomological inquiry.

Tales such as this one warn that analyses of complex, general-purpose thinking and its development leave something out if they neglect motivations and values. Which, it must be said, they by and large do. For example, Sternberg's well-known triarchic theory of intelligence (Sternberg, 1985) makes ample room for a variety of cognitive components and aspects of intelligence. However, the passions and commitments of thinking are not part of his architecture. Feuerstein offers an analysis of thinking into a number of input, elaboration, and output processes (Feuerstein, 1980). Again, however, the mainspring that puts all this in motion does not appear. To be fair to these and other investigators, it is acknowledged here that they are perfectly cognizant of the importance of motivational and other factors that give the process of thinking impetus. The point is that such factors do not usually appear as part of the fundamental architecture of their theories. Such factors have a secondary status in their maps of the cognitive terrain.

However, scholars such as J. Baron (1985), Dewey (1930), Ennis (1987), Passmore (1967), Paul (1990), and Siegel (1988) have sought a broader view. Using the term *disposition* and/or related terms such as Dewey's (1930) notion of *good habits of mind* or Siegel's (1988) *critical spirit*, they have emphasized the importance of analyzing thinking from the standpoint of both abilities and dispositions. Roughly speaking, dispositions are behavioral tendencies: the tendency to cheat or play straight, the tendency to be bold or cautious, the tendency to give thinking time, to consider broader perspectives, to seek evidence vigorously, and so on. Dispositions can concern thinking (as the last three mentioned do) or other matters.

Such writers on thinking have underscored the importance of dispositions because abilities alone do not suffice for intelligent behavior. All too commonly, people know how to think better about something (for instance, to search for more options, consider further evidence, or look at the other side of the case) but are not disposed to do so for one reason or another (for instance, bias, prejudice, impatience, overconfidence, or simply a failure to notice that the situation invites broader and/or more careful thinking).

We put forth here a theory of thinking that emphasizes the role of dispositions. Like other dispositional perspectives, this theory challenges typical ability-centered theories. In contrast with prior dispositional perspectives, this theory restructures the concept of dispositions into "triadic dispositions," which include inclinations, sensitivities, and abilities; the reasons for this reconstruction are dispersed in the next section. Also in

contrast with prior dispositional perspectives, this theory introduces a small set of seven “master” dispositions that we argue encompass all or most of what good thinking involves.

We call this conception a “theory” in the same sense as Sternberg’s (1985) triarchic theory or J. Baron’s (1985) theory of rationality. Like those, the present theory offers an analytical decomposition of good thinking into subordinate mechanisms. It is based on logical arguments and a scattering of empirical evidence for the reality and importance of dispositions. But we also put it forth in a somewhat Lakatosian spirit, as a potentially progressive research program for inquiry into cognition (Lakatos & Musgrave, 1965). We argue that it raises provocative questions about existing models of thinking, casts new light on controversial issues in the field, connects in intriguing ways to findings in other promising areas of cognitive research, and has important implications for the education of good thinking.

At this point, one may well ask what sort of working definition of the term *good thinking* our analysis begins with. Although technical theories of intelligence abound, there are less formal, everyday conceptions of intelligence that take good thinking roughly to mean flexible, insightful, productive thinking (e.g., Sternberg, Conway, Ketron, & Bernstein, 1981). We use the term *good thinking* in this informal sense. Our conception of good thinking also comes close to that of J. Baron (1985, p. 103), who views good thinking as that which follows policies that help people to fulfill their goals. One could talk equally well about “rational thinking” (or for that matter “higher-order thinking” or “critical thinking”) instead of “good thinking.” However, the term *rational* has narrow connotations, suggesting a strict allegiance with formal logic and implying (wrongly, we would argue) an Aristotelian “purified view of intellect” (Stocker, 1980).

The argument for our dispositional theory of thinking is organized as follows: First, by presenting a conception of dispositions as an explanatory construct, showing how this conception can function as a unit of analysis for cognitive behavior. Then, this explanatory construct is used as the foundation for an analysis of good thinking into seven distinct yet closely interrelated dispositions. Finally, a number of generative connections are suggested between our dispositional analysis of good thinking and some literatures, questions, and issues that are of current interest in the study of cognition and cognitive development.

## DISPOSITIONS AS AN EXPLANATORY CONSTRUCT

It would be easy to see dispositions mainly as an effort to honor the role of motivation in complex cognition, and certainly this is one of the

objectives. However, to treat dispositions as solely about motivation would be to take too narrow a view. Instead, we propose a conception of dispositions that includes attention to habits, perceptual sensitivities, and even abilities themselves. This conception puts forth dispositions as a unit of analysis for a broad and fruitful conception of mind.

Specifically, a *disposition* in our sense is a psychological element with three components: inclination, sensitivity, and ability. The three components contribute as follows: *Inclination* refers to the person's felt tendency toward behavior X. For example, a person with an inclination to open-minded thinking will feel a leaning toward open-minded thinking when he or she discerns the need. *Sensitivity*, in contrast, refers to the person's alertness to X occasions. For example, a person sensitive to the need for open-minded thinking will notice occasions where narrow thinking and prejudice and bias are likely and open-mindedness called for. Finally, *ability*, of course, refers to the actual ability to follow through with X behavior. A person with the ability to be open-minded knows how to go about it: resisting the impulse to decide quickly, listening to evidence for rival points of view, and so on.

Several theorists have discussed the role of dispositions in thinking (e.g., Baron, J., 1985; Ennis, 1987; Lipman, Sharp, & Oscanyon, 1980; McPeck, 1981; Passmore, 1967; Paul, 1990). How does the present view of dispositions contrast with theirs? Typically, theorists have offered a binary contrast between dispositions and abilities (or skills; or, in J. Baron's [1985] case, capacities, a deliberately more limited concept than abilities). For example, open-minded thinking would reflect, on the one hand, the disposition to think in an open-minded way, and, on the other, the ability to do so. In contrast, we distinguish within the traditional notion of disposition two elements, called *inclination* and *sensitivity*. Moreover, we reconceive the term *dispositions* in a more encompassing sense, to mean the trio of inclination, sensitivity, and ability, for reasons discussed shortly.

Our motive for restructuring the concept lies in the failure of the conventional disposition-ability contrast to highlight the inclination-sensitivity distinction. The conventional account either collapses the two under the one label of *dispositions*, or simply leaves out consideration of sensitivity. We urge that inclination and sensitivity are distinct and important constructs in explaining behavior.

Because sensitivity is the new element in the picture, what justifies its presence? First of all, the trio of inclination, sensitivity, and ability constitute individually necessary and jointly sufficient conditions for behavior. Without inclination, a person will not feel drawn toward X behavior. Without sensitivity, a person will not detect an X occasion. And, of

course, without the ability to follow through, sensitivity and inclination cannot generate the behavior.

Second, sensitivity cannot be equated with ability in the usual sense: the ability to follow through once cued to do something; for instance to say your name, do a sum, or jump a hurdle when asked. Sensitivity appears to involve a distinct perceptual or perception-like mechanism for detecting occasions in the absence of explicit prompts. Automatized perceptual processing is entailed, in the sense of automatization as discussed by Shiffrin and Schneider (1977; Schneider & Shiffrin, 1977), with little burden on conscious control mechanisms. Two other related ideas are the reflexive pattern-recognition apparatus that drives "production systems," in production system models of cognition (e.g., Anderson, 1983; Newell, 1990), and the responsiveness to recurrent patterns abstracted by neural networks in the recent parallel distributed processing paradigm (Hinton, 1986; McClelland & Rumelhardt, 1986).

Third, sensitivity cannot be equated with inclination. As a point of logic, an inclination to do X upon recognizing an X occasion simply is not the same as recognizing an X occasion. Moreover, empirically, people often do not do something for failure to recognize an occasion. Research on transfer and "inert knowledge" reveals such effects (e.g., Bereiter & Scardamalia, 1985; Bransford, Franks, Vye, & Sherwood, 1989; Perfetto, Bransford, & Franks, 1983; Perkins & Martin, 1986). For an example from some of our work on the cognition in computer programming: A student may be able to apply a construct like a FOR-NEXT loop effectively (ability), may want to solve the problem by using whatever means (inclination to use whatever constructs are needed), but may not recognize a problem as an occasion for FOR-NEXT loops (sensitivity to FOR-NEXT occasions) (Perkins & Martin, 1986). (It may be objected that sensitivity is an ability of a sort, the ability to recognize X occasions with minimal direct cues. This is true, but *ability* usually means the ability to execute a behavior when it is clearly cued.)

These arguments justify our attention to the triad of inclination, sensitivity, and ability. But why group all three under the label of *dispositions*? Why not instead maintain the usual disposition-ability contrast, treating dispositions as a compound of inclination and sensitivity? First, in our view, inclinations and sensitivities make a misleading and theoretically unsound grouping. Sensitivities are at least as ability-like (see the just-cited parenthetical remark) as they are motivation-like. Second, including abilities within dispositions is, in fact, sanctioned by the original philosophical roots of the concept of dispositions as applied to material objects, where a disposition like "brittleness" means the tendency to display a certain behavior (shatters) under certain conditions (when subjected to a

blow) (Ryle, 1949). However, in the end, our use of *dispositions* is a labeling convention. Our framework rests on the triad of inclination, sensitivity, and ability, whether dispositions applies to the triad or just the first two.

Before turning to the implications of this three-way analysis of dispositions for existing cognitive theory and research, we expand the proposed model further by describing in detail seven key dispositions for good thinking.

### THE KEY DISPOSITIONS FOR GOOD THINKING

The triad of inclination, sensitivity, and ability establishes a foundation for the dispositional analysis of cognition in general. However, how does this triad illuminate thinking, and good thinking in particular? What, that is, are thinking dispositions?

Some dispositions, such as the disposition to consider broad perspectives or to seek evidence, are specifically cognitive in character and affect thinking in particular. In contrast, more general dispositions, such as perseverance, can often benefit many not conspicuously thoughtful pursuits, such as dieting. Therefore, *thinking dispositions* can be defined as tendencies toward patterns of intellectual activity that condition and guide cognitive behavior specifically. However, because some thinking dispositions, such as giving up easily in the face of confusion, can work against good thinking, we stipulate that we are specifically interested in dispositions that benefit good thinking.

With thinking dispositions roughly defined, the next step is crucial. Is it possible to identify dispositions that are beneficial to good thinking in particular? The question is whether the essence of good thinking, in the everyday sense acknowledged earlier, can be articulated in terms of a few dispositions.

We believe that the answer is yes. Indeed, we advance the following bold claim: Good thinking can be characterized as reflecting seven broad thinking dispositions: exhaustively, from a normative standpoint; approximately, from a descriptive standpoint. These dispositions are:

1. To be broad and adventurous.
2. Toward sustained intellectual curiosity.
3. To clarify and seek understanding.
4. To be planful and strategic.
5. To be intellectually careful.
6. To seek and evaluate reasons.
7. To be metacognitive.

We argue that the ideal thinker is disposed toward all of these thinking behaviors, appropriately exhibiting one or more of them, depending on the thinking occasion. The less than perfect (but still good) thinker is disposed toward most of these at appropriate times, but in a less even and more human fashion.

What follows is a description of these seven dispositions. In keeping with our earlier analysis of dispositions as an explanatory construct, we characterize each disposition as a triad of inclinations, sensitivities, and abilities.

1. *The disposition to be broad and adventurous.*

*Key inclinations:* The tendency to be open-minded and to look beyond what is given; the impulse to probe assumptions and examine alternative points of view; the desire to tinker with boundaries and play with new ideas; the urge to speculate, generate many options, and explore multiple interpretations.

*Key sensitivities:* An alertness to binariness, dogmatism, sweeping generalities, narrow thinking, parochialism, and occasions when alternative perspectives are neglected.

*Key abilities:* The ability to identify assumptions, to look at things from other points of view, to generate and review multiple options; brainstorming; empathic thinking; flexible thinking.

2. *The disposition toward sustained intellectual curiosity.*

*Key inclinations:* A zest for inquiry; the urge to find and pose problems; the tendency to wonder, question, probe.

*Key sensitivities:* An alertness to unasked questions, anomalies, hidden facets; detection of gaps in one's knowledge or understanding; noticing what is unknown or unclear.

*Key abilities:* The ability to observe closely, to identify and challenge assumptions, to formulate and investigate provocative questions, to focus and persist in a line of inquiry.

3. *The disposition to clarify and seek understanding.*

*Key inclinations:* A desire to apprehend things clearly; the impulse to anchor ideas to experience and seek connections to prior knowledge; an urge to sharpen conceptions and examples; a desire to grasp the essence of things.

*Key sensitivities:* Alertness to unclarity and discomfort with vagueness; alertness to superficiality; detection of occasions needing a sharper focus; a leaning toward hard questions.

*Key abilities:* The ability to ask pointed questions and to build complex conceptualizations; the ability to apply and exemplify ideas, to make analogies and comparisons, to identify and classify details.



4. *The disposition to be planful and strategic.*  
*Key inclinations:* The urge to set goals and to make and execute plans; the tendency to approach things in a calculated and/or step-wise fashion; a desire to think ahead.  
*Key sensitivities:* Alertness to aimlessness, lack of direction, lack of orientation; alertness to off-hand thinking and sprawling thinking.  
*Key abilities:* The ability to formulate goals and to evaluate alternative modes of approach; the ability to make and execute plans and to forecast possible outcomes.
5. *The disposition to be intellectually careful.*  
*Key inclinations:* The urge for precision; a hunger for mental orderliness and organization; a desire to be thorough.  
*Key sensitivities:* Alertness to the possibility of error, to disorder and disorganization; awareness of the abiding potential for inaccuracy and inconsistency.  
*Key abilities:* The ability to process information precisely, to recognize and apply intellectual standards, to construct order out of disarray.
6. *The disposition to seek and evaluate reasons.*  
*Key inclinations:* A leaning toward healthy skepticism; the tendency to question the given, to probe assumptions and biases; the drive to pursue and demand justification; the urge to discover underlying grounds and sources.  
*Key sensitivities:* an alertness to evidential foundations; a responsiveness to superficiality and over-generalization, a wariness of gaps in knowledge.  
*Key abilities:* The ability to distinguish cause and effect, the ability to identify logical structure; the ability to reason inductively, the ability to weigh and assess reasons.
7. *The disposition to be metacognitive.*  
*Key inclinations:* The urge to be cognitively self-aware and to monitor the flow of one's thinking; the impulse to stand back and take stock; the desire to be self-challenging.  
*Key sensitivities:* Alertness to loss of control of one's thinking; detection of complex thinking situations requiring self-monitoring; recognition of the need to look back on a thinking episode.  
*Key abilities:* The ability to exercise executive control of mental processes, to conceive of the mind as active and interpretive, to be self-evaluative, to reflect on prior thinking.

#### *Why These Seven Dispositions?*

In Kurosawa's classic film, *The Seven Samurai*, each samurai played a complementary role in the unfolding tale. But what makes our seven dispo-

sitions, and not more or fewer, the right combination to mobilize good thinking? Of course, we could divide more (for instance, splitting Number 4 into planful and strategic) or group more (for instance, pooling Numbers 1 and 2). The choice of these seven dispositions reflects our judgment of the right grain level for a useful overarching framework. The general scope and nature of the seven find a number of supporting arguments.

*Individually necessary.* The seven dispositions seem individually necessary for a comprehensive conception of good thinking practices. A good Gedanken experiment to test this proposition asks, "Which one would you drop?" Should we, for example, dispense with sustained curiosity? But such curiosity makes inquiry persistent. Being intellectually careful? Without it, mistakes would proliferate. Planful and strategic? What then to make of the apparent payoffs of planful, strategic thinking (Polya, 1954, 1957) and the fact of rich strategic repertoires in expert thinking (Chase & Simon, 1973; Chi, Glaser, & Rees, 1982; Glaser, 1984)? The pattern is clear: None are dispensable, except in the superficial sense of pooling Numbers 2 or 3 into a larger category.

*Collectively comprehensive.* A more difficult question asks whether the seven leave out important dispositions. We cannot offer a logical proof of completeness. But we have tried hard for comprehensiveness. The seven subsume dispositions that are discussed in three sources: Ennis's (1987) well-known analysis of dispositions, J. B. Baron's (1987) taxonomy, and Barell's (1991) perspective.

*Normatively appropriate.* A normative theory of thinking specifies the properties of thinking that make it good. Following J. Baron (1985), a test of a good normative model of thinking is that it fits with strong cultural intuitions, is clarifying (particularly in developing prescriptions for thinking behaviors), and helps with advice giving. Collectively, the seven dispositions pass this test. All seven have a cultural presence in everyday beliefs, folk sayings, and language about the mind. For example, the folksaying "Look before you leap" reflects the disposition to be planful and strategic; and "He who hesitates is lost" reflects the disposition to be adventurous. Although maxims like these appear contradictory, Dörner and Schölkopf (1991) have argued that they are not so much contradictory as appropriate to different times and contexts. Concerning everyday language, commonplace terms like *curiosity* and *clarity* testify to the cultural importance of such traits of mind. Although the term *metacognition* is not part of common talk, everyday notions such as *mindfulness*, *thoughtfulness*, and *reflectiveness* express much the same spirit.

In addition to fitting with strong cultural intuitions, each of the seven dispositions clarifies prescriptions and provides advice for thinking behaviors. For example, the norm expressed by the disposition to be broad and

exploratory prescribes open-mindedness, and advises such actions as looking at things from several points of view and generating multiple options. The norm expressed by the disposition to be planful and strategic prescribes thoughtful goal making, and advises such actions as thinking ahead to possible consequences and developing and executing stepwise plans. Each of the seven dispositions expresses its own specific norm, and generates both prescriptions and advice for thinking behaviors.

*Functionally balanced.* To continue our rationale, the seven dispositions form a functionally balanced team; that is, they complement one another to foster good thinking overall. For example, being broad and adventurous all the time does not favor good thinking. One must balance that with being intellectually careful, seeking and evaluating reasons, and so on. Thus, dispositions that serve contradictory immediate goals can counterbalance one another's weaknesses over time to benefit thinking overall. Together the seven dispositions form a supportive network greater than the sum of its parts whose overall functioning is enhanced by the complementarity.

In summary, apart from pooling or subdividing, we argue that the seven dispositions outlined here constitute necessary and sufficient elements for a broad normative characterization of good thinking.

### THE GENERATIVITY OF A DISPOSITION-BASED MODEL OF THINKING

We have now laid out our dispositional model of thinking. We have shown how the triad of inclinations, sensitivities, and abilities serves as an explanatory construct for dispositions in general, and how rationality can be characterized as consisting of seven distinct yet interrelated triadic thinking dispositions. What remains is to make good on our promise to show how this dispositional perspective is generative of new ways of thinking about questions, issues, and literatures of current interest in the study of cognition. Naturally, it is impossible to cover here all possible generative connections to existing research. So we have taken an eclectic approach. We have chosen a handful of connections that we think are both of current interest, and that, taken as a group, suggest the array of issues in cognitive psychology that invite reconsideration from a thinking dispositions perspective.

#### *How This Theory Extends Other Dispositional Models*

A few philosophers, psychologists, and educators have put forth frameworks that recognize the importance of dispositions in good think-

ing. How does the proposed model draw upon these frameworks and how does it extend them in generative ways?

From several philosophers (Ennis, 1989; McPeck, 1981; Paul, 1990; Schrag, 1988; Siegel, 1988) and the psychologist, J. Baron (1985), we have gained well-developed arguments for the centrality of dispositions to good thinking. From a few educators concerned with the teaching of thinking (Barell, 1991; Baron, J. B., 1987; Ennis, 1989), we have gained several taxonomies of thinking dispositions and an emphasis on the importance of thinking dispositions for education. Our conception encompasses the dispositions identified in others' taxonomies and, like Barell's and Ennis's models, it provides an alternative to traditional skills-centered approaches to the teaching of thinking.

Our model extends these philosophical and educational perspectives by adding a psychological mechanism for thinking dispositions and by making connections to the psychological literature on human development and contemporary theories of human intelligence. The introduction of a psychological mechanism—the trio of inclinations, sensitivities, and abilities—is a contribution to these perspectives because it pushes toward a more explanatory account of the mechanism of dispositions. The triadic analysis is generative because it provides insight into the composition and mechanism of each disposition and offers some direction toward means of cultivating thinking dispositions.

From some psychologists, we draw empirical evidence for the reality of certain overarching dispositions like mindfulness (Langer, 1989; Solomon, 1983) and more specific dispositions like entity versus incremental learning (Dweck & Bempechat, 1980). Because psychologists have seldom offered taxonomies, our conception of seven dispositions is generative because it connects a taxonomy with a psychological perspective. Our triadic analysis is particularly generative because it offers greater specificity regarding the psychological mechanism of dispositions. For example, whereas Langer (1989) talks about mindfulness as a broad spectrum alertness to the world, our concept of sensitivities delineates specific sensitivities, as well as inclinations, and abilities, for different facets of thinking dispositions. The triadic mechanism is generative for further research because it has implications for and raises new sets of questions about how dispositions develop.

### *How This Theory Recasts Ability-Centered Theories of Thinking*

There are several extant models of thinking. How does the present one compare with others, and what new issues are generated by such comparisons? This is a question that needs to be approached with some

diffidence. Research on effective thinking is an active area of inquiry (e.g., Baron, J., 1985; Chipman, Segal, & Glaser, 1985; Nickerson, Perkins, & Smith, 1985; Segal, Chipman, & Glaser, 1985). Also relevant are efforts to build comprehensive models of complex cognition (Anderson, 1983; Newell, 1990). Although considerable agreement exists at a certain level (e.g., on the importance of metacognition), there are numerous divergences. Simply to construct a careful comparison and critique of other models would be a daunting task, never mind including the present one.

These realities recommend a comparison of severely limited scope. Some contemporary theories are already quite dispositional, such as J. Baron's (1985) theory of rationality or Feuerstein's (1980) instrumental enrichment. Others, such as Anderson's (1983) ACT\* and Newell's (1990) SOAR, concern thinking in general but do not aim to explain especially intelligent or "higher-order" thinking. We adopt an intermediate course. We outline a comparison with Sternberg's (1985) triarchic theory of intelligence, a well-known contemporary theory that specifically includes especially good, intelligent, or "higher-order" thinking.

Sternberg proposes an architecture consisting of three major subtheories: the contextual theory, the experiential theory, and the componential theory. We focus on the componential subtheory, which deals with very general processes that serve cognition widely, including contextual and experiential intelligence. Among the processes identified are three processes of selection—selective encoding, comparison, and combination—and eight "metacomponents," executive processes that serve thinking, including, for example, recognizing that a problem exists, recognizing the nature of the problem, and selecting a set of lower order (nonexecutive) components for a task.

The triarchic theory has been thoughtfully conceived and refined over the years. In it many concepts and findings are synthesized from several branches of contemporary psychology. However, like most contemporary models of the mechanisms of intelligent behavior, the triarchic theory is ability-centered. It decomposes intelligent cognitive functioning into subprocesses such as selective encoding and defining problems, dispositions having no conspicuous place in the architecture. It would be unfair to suggest that Sternberg takes no cognizance of elements other than abilities. On the contrary, recognizing that a problem exists or, more generally, selective encoding would include some aspects of what we have called *sensitivity*. But the triarchic theory does not give central attention to the role of sensitivities and inclinations, elements needed to close the gap between ability and actual behavior.

For a second point, it is surprisingly easy to convert the triarchic

theory (and other theories) into a more dispositionally oriented model. One can take any component and simply redescribe it as a disposition. For example, the triarchic theory includes the subprocess of recognizing that a problem exists. One could instead speak of "the triadic disposition to recognize that a problem exists," which would include sensitivity to potential problem situations, the inclination to view them as such, and the ability to actually cognize the situation as a problem. For selective encoding, one could speak of the inclination to encode especially selectively on appropriate occasions (because perception is, of course, always quite selective), the sensitivity to occasions that call for particular selectivity, and the ability to carry out the especially selective kinds of encoding called for.

This "dispositionalizing" of the triarchic theory highlights a complex substructure of necessary cognitive processing that otherwise might get missed. It challenges one to think of where inclinations come from and how they might be cultivated. It challenges one to ponder what the symptoms are of problem situations or situations inviting exploration, to better see to what cues sensitivity has to be sensitive.

For a third point, the seven dispositions identified earlier constitute a level of analysis both broader and more eclectically and culturally based than the triarchic theory, even when it is "dispositionalized." Notions like broad thinking and precise thinking acknowledge very general directions in good thinking prominent in both common sense and philosophical writings. We believe that these very general directions have psychological reality in well-developed thinkers, although this may be a long-term achievement requiring the gradual extension of these dispositions from more local contexts. As argued earlier, these directions also have a normative status: They are ideals to strive for in each arena of local knowledge. Dispositions as an analytical construct particularly lend themselves to modeling these directions.

### *Thinking Dispositions and the Issue of Generality*

Some very general thinking dispositions have been discussed here, such as the disposition to think broadly and adventurously or to think planfully and strategically. Do such dispositions have any psychological reality? The proposal that they figure importantly in human cognition runs counter to a recent trend in contemporary psychology of strong skepticism about the reality of very general intellectual skills.

This trend might be called the *local knowledge position*. For example, based on studies of expertise, Glaser (1984) has argued for the largely discipline-bound character of knowledge and skill. More recently, Brown,

Collins, and Duguid (1989) have articulated the case for *situated cognition*, cognition supported by familiarity with particular concrete contexts. For instance, the point is made that people function quite well in many practical situations requiring arithmetic, by using situation-specific strategies; yet they may show poor performance on formal tests of the same abilities. In his studies of intelligence, Ceci (1990) has identified several cases where performance is quite context sensitive: The same performance couched in difference contexts often proves much more or less accessible depending on the context.

How does our dispositional perspective respond to the local knowledge position? First of all, we emphasize that the local knowledge position is under debate and not the received view of cognitive psychology. For example, Sternberg in his well-known triarchic theory incorporates very general facets of mind, especially his "metacomponents," while also acknowledging the importance of local knowledge. Perkins and Salomon (1989) have argued that the battle over domain-specific versus domain-general has been too polarized; they recognize a range of generality and note how general schemata become modulated into more specialized forms when applied within specific domains. Ennis (1989) has critiqued the philosophical and psychological underpinnings of the notion of local knowledge and domain-boundedness. Langer (Langer, Blank, & Chano-witz, 1978; Langer & Imber, 1979) has accumulated an impressive body of experimental evidence for the general psychological states of "mindfulness" versus "mindlessness" and their impact on cognition. J. Baron (1985) argues for the importance of several general kinds of searches and their effective management in good thinking.

Second, the triadic concept of dispositions makes sense whether one is speaking of broader, more domain-general dispositions or narrower, more situated dispositions. If a local knowledge position ultimately prevails, the triadic conception of dispositions can still be useful.

Third, triadic dispositions help to explain how good thinking might be general and specific in different ways at the same time. Even if abilities are rather domain specific, some inclinations and sensitivities may be very general. For example, an inclination to seek evidence and a sensitivity to whether it exists could marshall highly domain-specific abilities: for constructing a proof in mathematics, designing a physics experiment, or looking to the text for evidence in literature.

### *Thinking Dispositions and Conceptual Development*

A newly emergent perspective on cognitive development that bears on the development of thinking dispositions is one which focuses on the



role of evolving conceptual frameworks in cognitive change. Research in this area shows that children quite early begin to develop a "theory of mind." The core insight is that, at quite a young age, children come to see themselves as "things which think" (Olson, Astington, & Harris, 1988). The theory of mind perspective connects in an interesting way with a dispositional approach because it deals with the evolution of key epistemological beliefs that underpin and enable the development of thinking dispositions.

On the theory of mind view, intellectual progress is understood as the development of an increasingly sophisticated network of beliefs about one's own and others' minds, and beliefs about how minds interact with information to represent and interpret the world (Carey, 1985; Leslie, 1988; Perner, 1991; Wellman, 1985). For example, good thinking at any age presupposes the basic insight that thoughts are more than a "copy" of reality. To do such things as conceive of the possibility of multiple options, weigh and compare plans, and speculate about how things might be different, the child must have some form of belief in the interpretive nature of mind (Wellman, 1990), a belief that experience can be interpreted in many ways, and that varying conceptions of things are possible.

What does an interpretive understanding of mind have to do with thinking dispositions? Wellman argues that children's theory of mind moves along a continuum from container-like, in which they regard the mind a repository for holding ideas, to active and constructive, in which they regard the mind as playing an active role in the processing of information, often in a personified way (Wellman, 1990). This move toward an active understanding of mind is crucial to the development of virtually all the thinking dispositions we have identified. To pick just one example, the inclinations related to the disposition to be broad and adventurous—an impulse to explore alternative points of view, an urge to generate many options—depend on the conceptual developmental capacity to conceive of the mind as actively interacting with information.

The important message here is that at least by the beginning of formal schooling, children can begin developing many of the key inclinations, sensitivities, and abilities associated with thinking dispositions. For example, an alertness to anomalies, an inclination to look at things from other points of view, an ability to evaluate reasons, are all undergirded by a conception of the mind as active with regard to the processing of information.

Although an active theory of mind is a necessary foundation, the development of sophisticated thinking dispositions relies on the continued evolution of a more mature constructivist epistemology, and the individual's beliefs about how knowledge is acquired and views of him or



herself as a learner affect the development of thinking dispositions. For example, Dweck (Dweck & Bempechat, 1980) distinguishes between *entity learners* and *incremental learners*. Entity learners conceive of understanding as occurring in one large chunk, and tend to take an “either you get it or you don’t” attitude toward new topics, withdrawing if they do not see early success. In contrast, incremental learners conceive of understanding as acquired in increments, and tend to persist in learning behaviors, building up understandings of difficult topics gradually. Dweck emphasizes that belief systems about the nature of intelligence underlie the entity and incremental attitudes. Entity learners, she explains, have developed a belief system about intelligence that views it as essentially unchangeable and not responsive to effort. Incremental learners, in contrast, have a more proactive belief system asserting the responsiveness of mental capacity to effort.

All this can be cast in dispositional terms. For example, an incremental style consists of the inclination to persist in building understandings bit by bit, the sensitivity to register degree of challenge and progress on a topic, and the ability to follow through. The underlying incremental belief system is manifested through the triad of inclination, sensitivity, and ability that make up the disposition for incremental learning. In similar ways, belief systems about learning, epistemology, and self underlie all of the seven thinking dispositions.

### *Thinking Dispositions and the Influence of Culture*

Emphasis on the dispositional side of thinking implies that development involves more than just the growth of cognitive abilities. The idiom of traditional developmental psychology, with its focus on the individual’s cognitive capacities, concentrates on internally-propelled change. The growth of dispositions, however, cannot be explained by looking at the individual as a self-contained system. Because dispositions are grounded in belief systems, values, and attitudes as much as in cognitive structures, we need a culturally based account of their development.

An alternative tradition in developmental psychology, emanating from the work of Vygotsky, acknowledges the role of social and cultural influence on development. Vygotsky (1978) argues that thinking is a social activity, initially shared between people but gradually internalized in the individual. Cultural artifacts (language in particular) are experienced through interaction, re-enacted by the individual, and eventually internalized. In a similar vein, Brown, Collins, and Duguid (1989) call learning a matter of *enculturation*: by observing and living within a particular cul-

ture, people gradually start to adopt the behavior and belief systems of the culture.

A dispositional analysis of thinking is closely linked to a culturally-based perspective on cognitive development because dispositions are acquired in precisely the same way that learning is enculturated: through institutional and interpersonal levels of social contact. At the institutional level, political or school cultures can foster particular thinking dispositions. For example, political institutions like the "freedom of speech," and university ideals such as the "marketplace of ideas," embody a cultural value for open-mindedness. At the interpersonal level, children may develop thinking dispositions through social interaction with more experienced members of society (Vygotsky, 1978). For example, a child whose family members model acceptance of different viewpoints may encourage the development of the disposition to be broad and adventurous.

Modeling can also be more explicitly guided. For example, thinking dispositions can be modeled through guided learning, including cognitive apprenticeship (Collins, Brown, & Newman, 1989), reciprocal teaching (Brown & Palincsar, 1989), and expert scaffolding (Wertsch, 1978). In addition, interpersonal contact with peers in group and cooperative learning situations can also help to foster good thinking dispositions by creating social demands for rigorous thinking.

## CONCLUSION

Although an ability-based analysis of thinking captures an important aspect of intelligent intellectual behavior, we have argued that it cannot tell the whole story alone. The concept of *ability* (or "skill," or "process") fails to provide a logically sufficient basis for explaining action; the activity of good thinking is most aptly characterized as dispositional behavior.

Our discussion has mainly focused on the theoretical implications of a dispositional model of thinking. But there are also practical implications for education. For one, to cultivate a disposition, instruction must attend to all of the three aspects of the dispositional triad, individually as well as collectively. For example, suppose that one wants to develop in learners the disposition to be playful and strategic. To cultivate the right inclinations, one must provide learners with frequent opportunities to set goals and make plans for themselves in meaningful contexts. To encourage sensitivities, one might sensitize learners to such things as process/outcome structures, and instances of directionless and sprawling thinking. To cultivate playful and strategic abilities, one might teach strategies

or heuristics for articulating goals, forecasting outcomes, and so on. Each of these efforts entails slightly different instructional agendas. Yet, the agendas need simultaneous pursuit, to ensure that all aspects of the dispositional triad merge into a functioning thinking disposition.

Seen from a dispositional perspective, efforts to teach thinking invite a broader and different pattern of emphasis than one usually finds. Many programs today attempt to cultivate better thinking, but most reflect the dominance of ability-centered theories of thinking. For example, Edward de Bono's well-known *CoRT* program focuses on a sizable set of strategies for broad and systematic thinking (de Bono, 1973–75). The *Odyssey* program teaches a number of strategies for classification, categorization, decision making, design, and other kinds of thinking (Herrnstein, et al., 1986). These and many other approaches certainly honor dispositions in a sense: They teach in a lively, engaging manner, and simply by involving students in serious and intriguing episodes of thinking would build some sensitivities and inclinations. Nonetheless, approaches that address sensitivities and inclinations point-blank may afford greater leverage.

Such approaches are just beginning to emerge. For instance, mentioned earlier was Barell's recent book, *Teaching for Thoughtfulness*. The perspective advanced in this book highlights the general disposition of thoughtfulness along with the dispositions to be reasonable, seek meaning, understand, and be metacognitive. The years to come will probably see many other initiatives in like spirit in the educational community.

We conclude that a dispositional perspective on thinking offers much both to theory and practice. Yet it has to be acknowledged that the notion of dispositions has its problems as a theoretical construct. The concept of dispositions is considered "messy," because it invokes a vague assortment of ill-defined or immeasurable behavioral influences. Recalling the Darwin anecdote from the Introduction, many professionals would welcome dispositions into their theories about as enthusiastically as beetles into their mouths.

Yet, like Darwin, we are enthusiastic enough to put up with the problems. Yes, dispositions inevitably include reference to things that are genuinely hard to pin down: motivations, affect, sensitivities, values, and the like. But these factors exert no less of an influence on behavior simply because they are hard to define, and we have argued they must figure prominently in a full account of good thinking. We have tried to give such an account: a dispositional theory of thinking that honors the motivational, perceptual, and affective dimensions of behavior, and that makes generative connections to both extant research and contemporary education.

REFERENCES

- ANDERSON, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.
- BARELL, J. (1991). *Teaching for thoughtfulness: Classroom strategies to enhance intellectual development*. New York: Longman.
- BARON, J. (1985). *Rationality and intelligence*. New York: Cambridge University Press.
- BARON, J. B. (1987). *Being disposed to thinking: A typology of attitudes and dispositions related to acquiring and using thinking skills*. Boston, MA: University of Massachusetts, Critical and Creative Thinking Program.
- BEREITER, C., & SCARDAMALIA, M. (1985). Cognitive coping strategies and the problem of inert knowledge. In S. S. Chipman, J. W. Segal, & R. Glaser (Eds.), *Thinking and learning skills: Vol. 2. Current research and open questions*. Hillsdale, NJ: Erlbaum.
- BRANSFORD, J. D., FRANKS, J. J., VYE, N. J., & SHERWOOD, R. D. (1989). New approaches to instruction: Because wisdom can't be told. In S. Vosniadou & A. Ortony (Eds.), *Similarity and analogical reasoning*. New York: Cambridge University Press.
- BROWN, J. S., COLLINS, A., & DUGUID, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18, 32–42.
- BROWN, A. L., & PALINCSAR, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. B. Resnick (Ed.), *Knowing and learning: Essays in honor of Robert Glaser*. Hillsdale, NJ: Erlbaum.
- CAREY, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.
- CECI, S. J. (1990). *On intelligence . . . more or less: A bio-ecological treatise on intellectual development*. Englewood Cliffs, NJ: Prentice Hall.
- CHASE, W. C., & SIMON, H. A. (1973). Perception in chess. *Cognitive Psychology*, 4, 55–81.
- CHI, M., GLASER, R., & REES, E. (1982). Expertise in problem solving. In R. Sternberg (Ed.), *Advances in the psychology of human intelligence*. Hillsdale, NJ: Erlbaum.
- CHIPMAN, S. F., SEGAL, J. W., & GLASER, R. (Eds.). (1985). *Thinking and learning skills: Vol. 2. Research and open questions*. Hillsdale, NJ: Erlbaum.
- COLLINS, A., BROWN, J. S., & NEWMAN, S. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser*. Hillsdale, NJ: Erlbaum.
- DE BONO, E. (1973–75). *CoRT thinking*. Blandford, England: Direct Education Services Limited.
- DEWEY, J. (1930). *Human nature and conduct*. New York: The Modern Library.
- DÖRNER D., & SCHÖLKOPF, J. (1991). Controlling complex systems: Or expertise as "grandmother's know-how." In K. A. Ericsson & J. Smith (Eds.), *Toward a general theory of expertise: Prospects and limits*. New York: Cambridge University Press.
- DUNCKER, K. (1945). On problem solving. *Psychological Monographs*, 58, 1–113.

- DWECK, C. S., & BEMPECHAT, J. (1980). Children's theories of intelligence: Consequences for learning. In S. G. Paris, G. M. Olson, & H. W. Stevenson (Eds.), *Learning and motivation in the classroom*. Hillsdale, NJ: Erlbaum.
- ENNIS, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron & R. S. Sternberg (Eds.), *Teaching thinking skills: Theory and practice*. New York: W. H. Freeman.
- ENNIS, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher*, 18, 4–10.
- FEUERSTEIN, R. (1980). *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore, MD: University Park Press.
- GLASER, R. (1984). Education and thinking: The role of knowledge. *American Psychologist*, 39, 93–104.
- HERRNSTEIN, R. J., NICKERSON, R. S., SANCHEZ, M., & SWETS, J. A. (1986). Teaching thinking skills. *American Psychologist*, 41, 1279–1289.
- HINTON, G. E. (1986). Learning distributed representations of concepts. *Proceedings of the Eighth Annual Conference of the Cognitive Science Society*, Amherst, MA.
- LAKATOS, I., & MUSGRAVE, A. (Eds.). (1965). Criticism and the growth of knowledge. *International Colloquium in the Philosophy of Science*, Bedford College.
- LANGER, E. (1989). *Mindfulness*. Reading, MA: Addison-Wesley.
- LANGER, E. J., BLANK, A., & CHANOWITZ, B. (1978). The mindlessness of ostensibly thoughtful action: The role of "placebic information" in interpersonal interaction. *Journal of Personality and Social Psychology*, 36, 635–642.
- LANGER, E. J., & IMBER, L. E. (1979). When practice makes imperfect: Debilitating effects of overlearning. *Journal of Personality and Social Psychology*, 37, 2014–2024.
- LESLIE, A. M. (1988). Some implications of pretense for mechanisms underlying the child's theory of mind. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind*. Cambridge, England: Cambridge University Press.
- LIPMAN, M., SHARP, A., & OSCANYON, F. (1980). *Philosophy in the classroom*. Philadelphia: Temple University Press.
- McCLELLAND, J. L., & RUMELHARDT, D. E. (Eds.). (1986). *Parallel distributed processing: Explorations in the micro-structure of cognition* (Vols. 1 & 2). Cambridge, MA: MIT Press.
- McPECK, J. E. (1981). *Critical thinking and education*. New York: St. Martin's Press.
- NEWELL, A. (1990). *Theories of cognition*. Cambridge, MA: Harvard University Press.
- NICKERSON, R., PERKINS, D. N., & SMITH, E. (1985). *The teaching of thinking*. Hillsdale, NJ: Erlbaum.
- OLSON, D. R., ASTINGTON, J. W., & HARRIS, P. L. (1988). Introduction. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind*. Cambridge, England: Cambridge University Press.
- PASSMORE, J. (1967). On teaching to be critical. In R. S. Peters (Ed.), *The concept of education*. London: Routledge & Kegan Paul.

- PAUL, R. W. (1990). *Critical thinking: What every person needs to survive in a rapidly changing world*. Rohnert Park, CA: Center for Critical Thinking and Moral Critique, Sonoma State University.
- PERFETTO, G. A., BRANSFORD, J. D., & FRANKS, J. J. (1983). Constraints on access in a problem solving context. *Memory & Cognition*, 11, 24–31.
- PERKINS, D. N., & MARTIN, F. (1986). Fragile knowledge and neglected strategies in novice programmers. In E. Soloway & S. Iyengar (Eds.), *Empirical studies of programmers*. Norwood, NJ: Ablex.
- PERKINS, D. N., & SALOMON, G. (1989). Are cognitive skills context bound? *Educational Researcher*, 18, 1, 16–25.
- PERNER, J. (1991). *Understanding the representational mind*. Cambridge, MA: MIT Press.
- POLYA, G. (1954). *Mathematics and plausible reasoning*. Princeton, NJ: Princeton University Press.
- POLYA, G. (1957). *How to solve it: A new aspect of mathematical method* (2nd ed.). Garden City, NY: Doubleday.
- RYLE, G. (1949). *The concept of mind*. London: Hutchinson House.
- SALOMON, G. (1983). The differential investment of mental effort in learning from different sources. *Educational Psychologist*, 18, 42–50.
- SCHNEIDER, W., & SHIFFRIN, R. M. (1977). Controlled and automatic human information processing: I. Detection, search, and attention. *Psychological Review*, 84, 1–66.
- SCHRAG, F. (1988). *Thinking in school and society*. New York: Routledge.
- SEGAL, J. W., CHIPMAN, S. F., & GLASER, R. (Eds.). (1985). *Thinking and learning skills: Vol. 1. Relating instruction to research*. Hillsdale, NJ: Erlbaum.
- SHIFFRIN, R. M., & SCHNEIDER, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending, and a general theory. *Psychological Review*, 84, 127–190.
- SIEGEL, H. (1988). *Educating reason: Rationality, critical thinking, and education*. New York: Routledge.
- STERNBERG, R. J. (1985). *Beyond I.Q.: A triarchic theory of human intelligence*. New York: Cambridge University Press.
- STERNBERG, R. J., CONWAY, B. C., KETRON, J. L., & BERNSTEIN, M. (1981). People's conception of intelligence. *Journal of Personality and Social Psychology*, 41, 37–55.
- STOCKER, M. (1980). Intellectual desire, emotion, and action. In A. O. Rorty, (Ed.), *Explaining emotion*. Berkeley, CA: University of California Press.
- VYGOTSKY, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- WELLMAN, H. M. (1985). The child's theory of mind: The development of conceptions of cognition. In S. R. Yussen (Ed.), *The growth of reflection in children*. Orlando, FL: Academic Press.
- WELLMAN, H. M. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.
- WERTSCH, J. V. (1978). Adult-child interaction and the roots of metacognition. *Quarterly Newsletter of the Institute for Comparative Human Development*, 1, 15–18.